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NOT PART OF THE WATER PLAN

**DRAFT Ecosystem Restoration Water Use Efficiency (WUE)**

Introduction to Policy Analysis (IPA) topic at the Goldman School of Public Policy

In a state where the demand for water often exceeds the supply, it is generally accepted that urban and agricultural users should utilize water in an efficient manner. But while urban and agricultural water use efficiency (fondly referred to in the water business as "WUE") is pretty well established, can the same concept be applied to the water that Mother Nature "uses?" In other words, as our understanding of environmental restoration improves, opportunities are emerging for achieving greater levels of ecosystem performance, with the application of the same or even lesser amounts of water. For instance, recovery of certain fisheries may benefit most not from more water, but from more *non*-water investments in riparian restoration, pollution prevention, or fish passage. The optimum mix of water and non-water resources to restore and protect the ecosystem—while difficult, complex, and controversial to determine—presents enormous opportunities for improving the overall performance of California's water management system.

One example of the difficulty of this dilemma is that much scientific uncertainty surrounds the assessment of the effectiveness and efficiency of actions taken to restore and protect aquatic ecosystems. In this context, "effectiveness" can be thought of as the amount of benefit gained (e.g., an increase in the abundance of a particular fish species); "efficiency," then, can be thought of as the effectiveness per unit of expenditure (e.g., water or money). As an analogy, agricultural WUE is generally measured as some amount (or value) of a crop produced per acre-foot of water, while gallons per capita is the traditional metric for urban WUE. For environmental water use, effectiveness and expenditure do not correspond one-to-one, because many complex factors (e.g. hydrology, biology, various anthropogenic activities, just to name a few) other than applied water (or money) influence the degree of ecosystem restoration achieved. Moreover, some ways of trying to evaluate environmental WUE, such as direct measurement of population-level effects to fisheries, could impose an unattainable burden of proof on—and present a barrier to—actions to improve the environment.

Beyond these many analytical challenges, it is also important to note that just the term—much less the concept of—"environmental WUE" is divisive to some in the water planning community. For them, the more water for the environment, the better off the environment is. Some might even say that environmental WUE is a code word for The Agenda that would take more water from the environment and send it instead to cities and farms, whose efficiency, in turn, they often question. If pushed a bit, though, they would probably argue that, actually, the environment is *inherently* efficient with water, because ecosystems naturally evolve, in a naturally effective manner, in response to constantly changing hydrological conditions—even though the question here is *not* whether Mother Nature is efficient, but whether humans are efficient at implementing effective environmental restoration *on behalf of* Mother Nature.

Nonetheless, taken together with their relatively high costs, the mere perception of wide variations in efficiency of various ecosystem restoration actions has motivated a search for more efficient alternatives. And without agreement on which alternatives those might be, opposition to further commitments of money and water for ecosystem restoration will continue. Thus, what is needed here is a systematic way of assessing the benefits and costs of environmental water use, that is, a system that could evaluate different water and non-water alternatives for restoring and protecting the environment. Such a system would first need to develop techniques (or at least concepts thereof) of how to measure environmental WUE. Because of the uncertainties in direct measurement, perhaps some indirect—though integrated—indicators of the success and expense of ecosystem restoration actions can be developed. This scheme must be consistent with various legal niceties (statutes, water rights, court cases) that often dictate how much water goes to various beneficial uses, including the environment. And in addressing a currently controversial topic, the system would have to be politically acceptable. In the end, a useful system would inform decision-makers as to the trade-offs between flow and non-flow actions for ecosystem restoration and protection, to get the most benefit from water, money, and time spent on such actions.